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ABSTRACT

Holland's Vocational Preference Inventory (VPI) and Super and Forrest's Career Development Inventory (CDI) are recommended in the their respective manuals for use with secondary school students regardless of academic ability. Scores on both instruments for 245 suburban high school seniors in this investigation were well below reported means. Canonical correlation and discriminant function analyses confirmed that students scoring higher on the CDI preferred a broader range of occupations on the CPI, and that both instruments may be overly dependent on academic ability. Despite independent theoretical and methodological roots, the VPI and CDI appear to be significantly related to each other and to grade point averages among high school seniors. Academic achievement bias may artificially depress scores for students likely to prefer jobs less dependent on reading ability and vocabulary skills implicit in these instruments. These findings also suggest that there may be threshold of vocational maturity, as measured by the CDI, below which students are not sufficiently interested in or informed about occupational choices to consider the range of job titles in the VPI. (Author)

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ACADEMIC ACHIEVEMENT BIAS IN VOCATIONAL PREFERENCE
AND CAREER DEVELOPMENT MEASURES

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Super and Holland appear to have stimulated two distinct approaches to career counseling and vocational preference measurement with their efforts to develop and validate the Career Development Inventory (CDI) and Vocational Preference Inventory (VPI), respectively. Super and Forrest's CDI (1972) represents one of the most recent efforts to operationalize the vocational maturity construct present in the work of many investigators of career counseling and occupational choice. Holland's VPI (1958, 1965, 1970) represents his theoretical formulation of vocational preferences as implicit measures of personality. Crites (1969) suggests Super and Holland appear to have stimulated the most distinct approaches to career counseling and preparation during the past 15 years. Super's vocational maturity construct has led to several attempts to develop instruments sensitive to its dimensions in the work of Crites (1961, 1965) and Gribbons and Lohnes (1964a, 1964b, 1968, 1969). The Career Development Inventory appears to be the most carefully prepared and validated measure of Super's vocational maturity construct. Similarly, Holland's theoretical formulation of vocational preferences as implicit measures of personality is represented best in the Vocational Preference Inventory he has developed and validated for use in his research.

The CDI consists of three scales of 33, 28 and 30 items. Scale A, Planning Orientation, assesses the degree of a student's awareness of and inclination toward occupational planning and choice. Scale B, Resources for

Exploration, is a self-rated assessment of used and available resources for planning and implementing occupational choice. Scale C, Information and Decisionmaking, assesses the student's knowledge and use of occupational information, and his or her ability to integrate personal and occupational information into educational and career planning decisions. These three scores are summed for a total score representing an overall measure of vocational maturity (Super and Forrest, 1972). Forrest (1971) developed the CDI under Super's supervision to assist in evaluation of the computer-assisted Educational and Career Exploration System (ECES) in the Flint, Mich., public schools. Thompson (1972) reviewed the history of measures of vocational maturity through the CDI. Super and Forrest prepared the manual for research and field trials of the instrument. The manual reports test-retest reliability coefficients at .85 for Scale A, .82 for Scale B, .71 for Scale C, and .87 for CDI total score. The manual offers evidence that CDI scores increase significantly from eighth to tenth to twelfth grades, as hypothesized in Super's definition of vocational maturity.

Holland's Vocational Preference Inventory is described in its manual (Holland, 1965, 1970) as a "personality inventory composed entirely of occupational titles. A person takes the inventory by merely indicating the occupations which he likes or dislikes." Holland developed the VPI as a measurement resource for his theory; its 11 scales represent personality types and variables in his theory of vocational choice (Holland, 1966, 1973). The VPI also is proposed as a means to stimulate occupational exploration among high school and college students through exposure to its 160 job titles.

The first six VPI scales (Realistic, Intellectual, Social, Conventional, Enterprising and Artistic) represent Holland's six topological classifications of personality and environments. The remaining five scales assess other personality variables of interest to Holland. They are labelled Self-Control, Masculinity, Status, Infrequency and Acquiescence. Students complete the VPI by answering "yes" or "no" to indicate their preference for each of the 160 job titles. The first six scales are scored by counting the number of "preferred" jobs in each scale's list of 14 titles; the remaining scales are scored on the basis of empirical results during Holland's six revisions of the VPI. The scales in the sixth revision, which was used in this study, are relatively homogeneous, independent, and, except for the Acquiescence Scale, contain no overlapping items. The Acquiescence Scale attempts to measure "agreeableness" by counting the number of "yes" responses in the first 30 items of the VPI.

Scale reliabilities for VPI scoring are reported in the manual for employed adults and college freshmen. Internal consistency reliabilities for male college freshmen range from .57 (Masculinity) to .89 (Intellectual), with eight of 11 coefficients above .75. Similar results are reported for female college freshmen. Test-retest reliabilities for college freshmen (males and females) range from .61 (Conventional Scale) to .93 (Acquiescence), with nine of 11 above .75. Scale norms for college freshmen ($N = 6190$) and coeds ($N = 6143$) are reported in the manual.

The most serious question about use of Holland's VPI involves claims of its validity as a personality measure. The manual reports scale inter-correlations with the MMPI, Gough's California Psychological Inventory, Edwards' Personal Preference Schedule, Cattell's 16 Personality Factor Questionnaire, and self-ratings. These intercorrelations offer equivocal support for Holland's claims of clinical interpretability in the VPI manual. Johnston (1972) contends that the VPI "probably has more validity and usefulness as a vocational inventory than as a personality measure. Most of the research supporting its usefulness has been in the vocational area." Lohnes endorses the VPI as "the best choice of an interest inventory for counseling and research." However, Lohnes (1972) also cautions against clinical interpretations suggested for score profiles in the manual. Both encourage use and interpretation of the VPI as vocational preference measures for secondary school and college students.

METHOD

Subjects

The subjects in this research were selected to avoid focusing too narrowly on special populations of extremely advantaged or disadvantaged adolescents. Keniston (1965) noted the difficulty of studying adolescents whose affluence creates special opportunities, or whose poverty creates disadvantages and barriers to education and occupational preparation:

The youths who live most easily with their freedom are the moderately talented, the moderately good looking, the moderately ambitious, and the moderately capable. The stars, beauty queens, and the geniuses are often overwhelmed with offers; the paupers, the ugly and the dull receive none; and the alienated, whatever their talents, find all offers counterfeit.

Seniors enrolled in a suburban high school west of Chicago were selected for this investigation. Of 276 enrolled in the fall of 1974, a total of 245 members of the Class of 1975 completed all testing with the VPI and CDI. These 245 students comprise the sample for this study. Neither affluence nor poverty are visible influences on the lives of adolescents in this sample. The median income for the suburb was reported as \$13,028 in the 1970 Census, with 63 percent of the families reporting annual incomes between \$10,000 and \$25,000. Only five of 26,000 residents were nonwhite, and 43 percent were foreign-born or first generation Americans. Nearly two-thirds of the community's work force was employed in sales, clerical, construction and mechanical trades; 33 percent worked in manufacturing firms, and 24 percent in retail or wholesale trade. The community is accurately characterized as working class, blue collar, with a balance of residents of American and European ancestry.

Procedure

All subjects completed the Vocational Preference Inventory and the Career Development Inventory in two testing sessions in the fall of 1974. Scoring was based on instructions in the manuals for the CDI and VPI, with one adjustment. Scale A of the CDI permits a range of responses to various career planning activities, but do not permit a student to respond that he or she has completed the activity. The top score in the manual gives five points for the response "I have made definite plans, and know what to do to carry them out." Subjects in this sample were permitted to consider a sixth response granting six points for "I did this while considering what plans to make." The change affects only the first 14 of 33 items in Scale A.

Two additional sets of variables were included in this study. First, cumulative grade point averages at the end of the students' third year of high school were used as measures of academic achievement. Second, each subject completed a six-page Work Experience Questionnaire developed for related research, but bearing no direct relationship to the present investigation.

RESULTS

Table 1 reports summary and descriptive data for measures of academic achievement, vocational preferences and vocational maturity. The most important result on the VPI and CDI are the presence of scores well below means reported for both instruments in their manuals. This is especially apparent in the first six scales of the Vocational Preference Inventory. Mean scores in the VPI manual are based on results from college freshmen; they range from 1.5 to 8.1 for VPI scales one through six. All means for the seniors in this study are below 2.8 on scales one through six. This suggests that subjects in this research may have failed to take the VPI seriously. An alternative explanation may be that these seniors, as a group, were unfamiliar with or disliked enough of the occupational titles in the VPI to depress their scores. Table 2 reports that more than 60 percent of the student in this sample liked fewer than three of the 14 job titles in each of these scales. Scale 11 (Acquiescence) indicates that these seniors liked a mean of 6.6 of the first 30 occupations listed in the VPI, while the manual reports a mean Acquiescence score of 11.6.

Table 1

MEANS, STANDARD DEVIATIONS, MEDIAN AND RANGES OF SCORES FOR VOCATIONAL PREFERENCE INVENTORY SCORES, CAREER DEVELOPMENT INVENTORY SCORES, AND ACADEMIC ACHIEVEMENT FOR 245 HIGH SCHOOL SENIORS

Variables	Mean	S.D.	Median	Range of Scores
Vocational Preference Inventory Scores				
1. Realistic	1.95	2.45	1.24	0 - 14
2. Intellectual	1.86	2.91	0.67	0 - 14
3. Social	2.72	3.01	1.74	0 - 14
4. Conventional	1.78	2.23	1.03	0 - 14
5. Enterprising	2.04	2.51	1.23	0 - 14
6. Artistic	2.33	3.03	1.12	0 - 14
7. Self-Control	10.59	3.44	11.56	0 - 14
8. Masculinity	7.08	2.41	7.67	0 - 14
9. Status	7.27	1.74	7.22	0 - 14
10. Infrequency	8.08	2.48	8.51	0 - 20
11. Acquiescence	6.62	4.42	5.96	0 - 30
Career Development Inventory				
Scale A	104.60	22.13	104.58	72 - 165
Scale B	238.04	48.64	239.00	124 - 358
Scale C	17.51	5.34	18.20	3 - 29
Total Score	360.19	60.82	357.00	184 - 524
Academic Achievement				
Grade Point Average	2.20	0.56	2.14	0.75 - 3.81

Another alternative explanation of low Vocational Preference Inventory scores may be reflected in measures of vocational maturity on the Career Development Inventory. Super's construct of vocational maturity posits that

Table 2

DISTRIBUTION OF RESPONSES TO VOCATIONAL PREFERENCE INVENTORY
SCALES ONE THROUGH SIX AMONG STUDENTS INDICATING
PREFERENCES FOR FEWER THAN THREE OCCUPATIONS

VPI Scales	Number preferring . . .			Percentate of Total Sample of 245 Seniors
	0	1	2	
	Occupational Titles			
1. Realistic	90	44	42	71.7 %
2. Intellectual	114	49	25	76.5 %
3. Social	76	39	31	59.6 %
4. Conventional	95	52	32	73.1 %
5. Enterprising	86	50	35	69.8 %
6. Artistic	102	33	28	66.5 %

an adolescent's degree of vocational development reflects his or her awareness of occupational choices and ability to find and use appropriate resources to assist in occupational choice and preparation. Students with lower vocational maturity scores, as measured by Super and Forrest's Career Development Inventory, therefore, might tend to be less well informed and able to consider a narrower range of occupations than those presented in Holland's VPI. Table 3 presents mean CDI scores for seniors in this sample and for tenth and twelfth graders as reported in the CDI manual. These results indicate that seniors in this research are closer to mean tenth grade scores reported in the manual than they are to mean twelfth grade scores.

Title 3

MEANS AND STANDARD DEVIATIONS OF CAREER DEVELOPMENT INVENTORY SCORES
FOR 245 SENIORS AND PREDICTED TENTH AND TWELFTH GRADE
SCORES FROM THE CAREER DEVELOPMENT INVENTORY MANUAL

CDI Scales	12th Graders in Sample		Predicted CDI Scores			
			10th Graders		12th Graders	
	Mean	S.D.	Mean	S.D.	Mean	S.D.*
Scale A	104.60	22.13	103.57	19.25	116.60	--
Scale B	238.04	48.64	237.51	45.49	257.32	--
Scale C	17.51	5.54	17.19	4.57	19.87	--
Total Score	360.19	60.82	358.61	58.61	395.97	--

* 12th Graders' standard deviations not reported in CDI manual.

Findings reported in Tables 2 and 3 suggest that the Vocational Preference Inventory and the Career Development Inventory may be related despite their independent theoretical and methodological roots. Table 4 confirms this hypothesis with canonical correlations yielding three significant pairs of canonical variables. Two are significant at the .01 level, and one at the .05 level. Students with higher scores on the Career Development Inventory tend to indicate preferences for a wider range of occupations in the Vocational Preference Inventory.

The first pair of canonical variables relate Scale B of the CDI, Resources for Exploration, to scales two through five of the VPI positively, and to scales six and ten of the VPI in an inverse relationship. The second pair of canonical variables relate Scale C of the CDI, Information and

Table 4

CANONICAL CORRELATION ANALYSIS BETWEEN CAREER DEVELOPMENT INVENTORY
AND VOCATIONAL PREFERENCE INVENTORY SCORES FOR 245 HS SENIORS

Canonical Variate Pairs	Canonical Correlation	Chi-Square	d.f. ¹	Signif. ²
First Pair	.39	94.05	44	.000
Second Pair	.31	54.82	30	.004
Third Pair	.27	30.70	18	.031

VPI, CDI Scales	Coefficients for Canonical Variables		
	First Pair of Canonical Variables	Second Pair of Canonical Variables	Third Pair of Canonical Variables

Vocational Preference Inventory Scores

1. Realistic	.06	-.24	.71
2. Intellectual	-.28	.44	-.68
3. Social	-.28	.59	.40
4. Conventional	-.30	-.09	-.46
5. Enterprising	-.51	-.29	-.26
6. Artistic	.70	.39	-.01
7. Self-Control	-.01	.21	-.56
8. Masculinity	.20	-.13	.03
9. Status	.18	.16	.78
10. Infrequency	.47	-.48	.22
11. Acquiescence	-.13	-.54	.07

Career Development Inventory Scores

Scale A	.09	.23	- .02
Scale B	- 1.55	- .14	- 1.14
Scale C	- .13	.92	.65
Total Score	.62	.05	- 2.66

1. Degrees of Freedom
2. Level of Significance

Decisionmaking, to scales two, three and six of the VPI positively, and to scales one, five, ten and 11 negatively. The third pair of canonical variables relate Scale B and the total CDI score, which Super and Forrest posit as an overall measure of vocational maturity, to scales one, three and nine of the VPI positively, and to scales two, four, five and seven of the VPI inversely. These results suggest a complex relationship between Super and Forrest's CDI and Holland's VPI.

These results led to a final set of multivariate tests of possible relationships between the Career Development Inventory and Vocational Preference Inventory with grade point averages as measures of overall academic achievement. Tables 5 and 6 present discriminant function analyses for two groups of subjects defined by partitioning the sample at the median grade point average (GPA) for students in this study. Discriminant function analyses between groups defined by median GPA are significant at the .05 level for the VPI, and at the .0001 level for the CDI. Students with higher grade point averages tend to prefer more of the occupations in the Social, Conventional, Intellectual and Masculinity scales. This is consistent with the types of jobs reflecting higher prestige or status in these scales; many of the jobs in those scales require more training than occupations listed in the Enterprising, Realistic and Artistic scales. Students with GPAs below the median tend to prefer jobs in the latter three scales, which include occupations less dependent on formal schooling.

Table 5

MEANS, STANDARD DEVIATIONS AND DISCRIMINANT FUNCTION COEFFICIENTS
FOR VOCATIONAL PREFERENCE INVENTORY SCORES OF 245 SENIORS
IN TWO GROUPS DEFINED BY MEDIAN GRADE POINT AVERAGE

VPI Scales		Group 1 ¹	Group 2 ²	Total	Orthogonal Discriminant Function Coefficients
Realistic	$\bar{X}$	2.02	1.89	1.95	-.12
	S.D.	2.52	2.39	2.45	
Intellectual	$\bar{X}$	1.50	2.22	1.86	.18
	S.D.	2.48	3.24	2.91	
Social	$\bar{X}$	2.39	3.05	2.72	.24
	S.D.	2.79	3.20	3.01	
Conventional	$\bar{X}$	1.61	1.94	1.78	.21
	S.D.	2.24	2.22	2.23	
Enterprising	$\bar{X}$	2.02	2.06	2.04	-.12
	S.D.	2.73	2.29	2.51	
Artistic	$\bar{X}$	2.52	2.15	2.33	-.19
	S.D.	3.14	2.91	3.03	
Self-Control	$\bar{X}$	10.57	10.61	10.59	.02
	S.D.	3.39	3.51	3.44	
Masculinity	$\bar{X}$	6.96	7.19	7.08	.19
	S.D.	2.29	2.52	2.41	
Status	$\bar{X}$	7.07	7.48	7.27	.15
	S.D.	1.70	1.76	1.74	
Infrequency	$\bar{X}$	8.35	7.82	8.08	-.21
	S.D.	2.39	2.54	2.48	
Acquiescence	$\bar{X}$	6.35	6.88	6.62	-.06
	S.D.	4.45	4.38	4.41	
Group Centroids		-.32	.31	Wilks Lambda	.91
				Chi Square	22.40
				Significance	.02 (11 df)

1. Group 1: All subjects with GPA below median (2.14) N = 121
2. Group 2: All subjects with GPA above median N = 124

Table 6

MEANS, STANDARD DEVIATIONS AND DISCRIMINANT FUNCTION COEFFICIENTS
FOR CAREER DEVELOPMENT INVENTORY SCORES OF 245 SENIORS
IN TWO GROUPS DEFINED BY MEDIAN GRADE POINT AVERAGE

CDI Scales		Group 1 ¹	Group 2 ²	Total	Orthogonal Discriminant Function Coefficients
Scale A	$\bar{X}$	100.79	108.31	104.60	-.02
	S.D.	21.23	22.44	22.13	
Scale B	$\bar{X}$	232.12	243.81	238.04	-.01
	S.D.	49.44	47.23	48.64	
Scale C	$\bar{X}$	15.48	19.50	17.51	-.18
	S.D.	5.63	4.67	5.54	
Total Score	$\bar{X}$	348.80	371.31	360.19	.01
	S.D.	57.50	62.13	60.82	
Group Centroids		.42	-.41	Wilks Lambda	.85
				Chi Square	38.17
				Significance	.0001 (4 df)
1.	Group 1:	All subjects with GPA below median (2.14)			N = 121
2.	Group 2:	All subjects with GPA above median			N = 124

Table 6 presents results from discriminant function analysis with median grade point average as the independent variable and CDI scores as dependent variables. Students with higher grade point averages tend to score higher on all four CDI measures of vocational maturity. These findings suggest that vocational maturity, as measured by Super and Forrest's CDI, is significantly related to whether students in this sample had grades above the median grade point average for the entire sample of high school seniors.

DISCUSSION

This study indicates that despite independent theoretical and methodological roots, a significant relationship exists between Super and Forrest's Career Development Inventory, Holland's Vocational Preference Inventory, and academic achievement among high school seniors in a blue collar, working class community. These results suggest that academic achievement or its correlates, such as reading and vocabulary skills, may account for some of the shared variance between the VPI and the CDI.

Further consideration of these findings must occur with clear recognition of the limitations of this research. No cross-sectional study such as this, which uses correlational and descriptive data, can provide evidence of causal relationships. This study indicates that scores on the VPI, the CDI, and grades are related, but these results cannot be used to explain the cause or direction of such relationships. Those hypotheses remain to be explored in subsequent investigations.

This limitation does not, however, preclude suggestions of possible avenues of investigation to explore those causal relationships. Both the CDI and VPI may be dependent on vocabulary and reading skills to an extent not recognized in their respective manuals. The Career Development Inventory requires that students read a 12-page test booklet to complete its 91 items. Relatively high dependence on reading ability may artificially depress vocational maturity scores of students who lack stamina or reading skills

required to complete the CDI in its present form. A shorter reading task for the CDI may warrant further consideration. This limitation of the CDI, if confirmed in subsequent research, may restrict its appropriateness for studies involving students in dropout-prone or inner-city populations, in which reading skills typically are lower than those of the college-bound students who may have been over-represented in the samples used to develop and validate the CDI. Similar restriction in the range of CDI scores is not expected for students in schools with extremely high median reading scores; such relationships, if found, would present a far more serious challenge to Super's vocational maturity construct than is presented by the findings in this investigation. These findings, in fact, may be interpreted as supportive of Super's construct, as will be discussed later.

A similar limitation regarding career-relevant vocabulary skills may warrant attention in the use and interpretation of VPI scores. Holland's VPI manual indicates that it was designed for use with high school seniors, college students and employed adults. His research focused primarily on college-bound secondary school students and college undergraduates. The vocabulary skills of some secondary school seniors may be poor enough to depress their VPI scores artificially when they are familiar with an occupational area, but not with the job title used to represent that area on the VPI. This problem may, however, become more difficult to detect if career education programs successfully introduce students to a broader range of job titles in elementary and secondary schools.

Finally, the findings of this study tend to offer empirical support for Super's construct of vocational maturity in several ways. Students who are lower in vocational maturity, as measured in the CDI, tend to indicate preferences for relatively few of the job titles in the VPI. This affirms that students in this study were unfamiliar with enough of the occupational titles in the VPI to depress their scores -- for whatever reason those scores might have been depressed. This is consistent with Super's construct of a hierarchy of vocational development tasks represented by CDI scales. Students low in vocational maturity do indicate, as Super hypothesizes, that they know less about occupational opportunities and resources for vocational exploration than students with higher CDI scores.

Super's hierarchy remains intact in this study's findings. Super contends that planning orientation as measured by Scale A of the CDI is a prerequisite for the second task, exploration, as measured by Scale B. Once adolescents approach occupational choice as a personal responsibility and learn to identify and use resources for vocational exploration, the third stage begins, as measured by Scale C. Information and decision making reflect the adolescent's evolution toward meaningful occupational commitment through integration of education and occupational information with personal goals and values. This study also suggests, however, that there may be a threshold of vocational maturity, as measured by the CDI, below which students are not sufficiently interested in or informed about occupational choices to consider the range of job titles in the VPI. Students low in vocational maturity know less about occupational opportunities and resources, and may subsequently be less able to differentiate among and select jobs for career decisions.

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